

REMARKS

Applicant has reviewed and considered the Office Action mailed on December 16, 2004, and the references cited therewith.

Claims 3, 6, 8, 10, 17, 23, 25, 28, 33, and 40 are amended and claims 18 and 36-39 are canceled; as a result, claims 1-17, 19-35, and 40-43 are now pending in this application.

§102 Rejection of the Claims

Claims 17, 24, 27, 33 and 34 were rejected under 35 USC § 102(b) as being anticipated by Moore et al. (U.S. Patent No. 5,666,272).

Claim 17 has been amended herein to include the subject matter of previous dependent claim 18. That is, claim 17 has been amended to further define the antenna interface circuit as including "power amplifier impedance transformer circuitry." The Examiner rejected original claim 18 under 35 U.S.C. § 103(a) as being unpatentable over Moore et al. (U.S. Patent No. 5,666,272) in view of Lawrence et al. (U.S. Patent No. 5,936,584). This rejection is respectfully traversed.

The Examiner takes the position that Moore et al. discloses that the upper module 14 (in Fig. 5) contains an antenna 56 and one or more external components 54, but Moore et al. does not specify what the external components 54 comprise. The Examiner argues, however, that Lawrence et al. discloses that for maximum power transfer to occur between a power amplifier and an antenna, the impedance of the power amplifier and the antenna must be matched. Therefore, the Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time the invention was made to include the external power amplifier and power amplifier impedance transformer circuitry of Lawrence et al. within the external module 14 of Moore et al. in order to enable maximum signal power transfer from the die to the antenna. The Applicants respectfully disagree.

In Fig. 5 of Moore et al. and the associated description, a package 10 is disclosed that includes a lower module 12 and an upper module 14. The lower module 12 has a semiconductor chip 18 attached to a substrate 16. The upper module 14 houses an antenna 56 for receiving communication signals (column 6, lines 65-66) and one or more components 54 for wireless

communication (column 6, lines 55-57). The chip 18 processes the signals received from the antenna (column 6, lines 66-67). Moore et al. does not explicitly disclose a power amplifier within either the chip 18 of the lower module 12 or the component(s) 54 of the upper module 14. Therefore, as far as the reader of Moore et al. knows, there is no need for power amplifier impedance transformer circuitry within the upper module 14 to achieve maximum power transfer between a power amplifier and the antenna 56. However, as described above, the Examiner takes the position that it would have been obvious to one of ordinary skill in the art at the time the invention was made to include the external power amplifier AND power amplifier impedance transformer circuitry of Lawrence et al. within the external module 14 of Moore et al. "in order to enable maximum signal power transfer from the die to the antenna." This appears to be circular reasoning. The Examiner is stating that the motivation to modify Moore et al. based on Lawrence et al. is to achieve maximum signal power transfer between a power amplifier and an antenna, but Moore et al. does not disclose a power amplifier. Thus, the Examiner also adds a power amplifier from Lawrence et al. to Moore et al. The Applicants respectfully submit that a reference that describes the need to include impedance transformer circuitry between a power amplifier and an antenna to achieve maximum power transfer would not motivate a person of ordinary skill in the art to add power amplifier impedance transformer circuitry to a reference that does not disclose a power amplifier. Thus, the Examiner has failed to provide a valid motivation to combine Moore et al. and Lawrence et al. and has failed to establish a prima facie case of obviousness under 35 U.S.C. § 103(a) with respect to claim 17.

Based on at least the foregoing, it is submitted that the combination of Moore et al. and Lawrence et al. does not render obvious the invention as set out in amended claim 17. Reconsideration and allowance of claim 17 is therefore respectfully requested.

Claim 24 is a dependent claim that depends directly from independent claim 17. Consequently, claim 24 is allowable for the same reasons as independent claim 17. Claim 24 also provides further basis for patentability. That is, claim 24 further defines the antenna interface circuit of claim 17 as including "at least one antenna integrated therein." None of the references cited by the Examiner, either alone or in combination, disclose or suggest a system having an antenna interface circuit with (a) at least one terminal that is connected to at least one

terminal on the upper side of a microelectronic device package, (b) power amplifier impedance transformer circuitry, and (c) at least one integrated antenna.

Claim 27 is a dependent claim that depends directly from independent claim 17. Consequently, claim 27 is allowable for at least the same reasons as independent claim 17.

Claim 33 has been amended herein to include the subject matter of previous dependent claim 39. That is, claim 33 has been amended to further define the at least one terminal on the upper side of the package as including "at least one terminal to connect said microelectronic device to an external power amplifier impedance transformer." The Examiner rejected original claim 39 under 35 U.S.C. § 103(a) as being unpatentable over Moore et al. (U.S. Patent No. 5,666,272) in view of Lawrence et al. (U.S. Patent No. 5,936,584). This rejection is respectfully traversed for similar reasons to amended claim 17 discussed above. That is, Moore et al. does not explicitly disclose power amplifier circuitry. Thus, the fact that Lawrence et al. describes a need to include impedance transformer circuitry between a power amplifier and an antenna to achieve maximum power transfer would not motivate a person of ordinary skill in the art to add power amplifier impedance transformer circuitry to Moore et al. In paragraph III, on page 14 of the present Office Action, the Examiner states that it would have been obvious to one of ordinary skill in the art at the time the invention was made to include the external power amplifier AND power amplifier impedance transformer circuitry of Lawrence et al. within the external module 14 of Moore et al. in order to enable maximum signal power transfer from the die to the antenna. However, if the power amplifier of Lawrence et al. were added to the external module 14 of Moore et al. then there would be no need for the "at least one terminal to connect said microelectronic device to an external power amplifier impedance transformer" of amended claim 33. Instead, the microelectronic device would need at least one terminal to connect to the external power amplifier and not to the external power amplifier impedance transformer.

Based on at least the foregoing, it is submitted that the combination of Moore et al. and Lawrence et al. does not render obvious the invention as set out in amended claim 33. Reconsideration and allowance of claim 33 is therefore respectfully requested.

Claim 34 is a dependent claim that depends directly from independent claim 33. Consequently, claim 34 is allowable for at least the same reasons as independent claim 33.

§103 Rejection of the Claims

Claims 1, 2, 4 and 9 were rejected under 35 USC § 103(a) as being unpatentable over Moore et al. (U.S. Patent No. 5,666,272) in view of Lawrence et al. (U.S. Patent No. 5,936,584).

Claim 1 is an independent claim directed to an antenna interface circuit to provide an interface between a packaged microelectronic device and an antenna. The antenna interface circuit includes at least one of the following on one or more substrates: (a) metallization forming a power amplifier impedance transformer, (b) metallization forming a low noise amplifier input matching circuit, and (c) metallization forming a duplexer to couple an external transmitter and an external receiver to a common antenna. The antenna interface circuit also includes at least one electrical terminal to couple said antenna interface circuit to a microelectronic device package. The rejection of claim 1 is respectfully traversed for similar reasons to the rejection of amended claim 17 discussed above. That is, Moore et al. does not explicitly disclose power amplifier circuitry. Thus, the fact that Lawrence et al. describes a need to include impedance transformer circuitry between a power amplifier and an antenna to achieve maximum power transfer would not motivate a person of ordinary skill in the art to add power amplifier impedance transformer circuitry to Moore et al. Nor would it motivate a person of ordinary skill in the art to add a power amplifier and power amplifier impedance transformer circuitry to Moore et al. Therefore, because there is no motivation to combine the cited references, a prima facie case of obviousness has not been established. A similar argument applies to the “low noise amplifier input matching circuit” and the “duplexer” of claim 1.

Based on at least the foregoing, it is submitted that the combination of Moore et al. and Lawrence et al. does not render obvious the invention as set out in claim 1. Reconsideration and allowance of claim 1 is therefore respectfully requested.

Claims 2, 4, and 9 are dependent claims that each depend directly from independent claim 1. Consequently, these claims are allowable for at least the same reasons as independent claim 1. One or more of these claims also provide further basis for patentability. For example, dependent claim 9 further defines the “at least one electrical terminal” of the antenna interface circuit of claim 1 to include a ball grid array (BGA). None of the references cited by the Examiner, either alone or in combination, disclose or suggest such a antenna interface circuit. The Examiner takes the position that the electrical terminal 22 of Fig. 5 of Moore et al.

represents the claimed “at least one electrical terminal.” However, the electrical terminal 22 is on the substrate 16 of the lower module 12 of the package in Fig. 5. The upper module 14, which the Examiner has identified as the claimed “antenna interface circuit,” has detachable connectors 32 as terminals (see Fig. 3 of Moore et al.) and not a BGA.

Claims 5 and 7 were rejected under 35 USC § 103(a) as being unpatentable over Moore et al. (U.S. Patent No. 5,666,272) in view of Lawrence et al. (U.S. Patent No. 5,936,584) as applied to claim 1 above, and further in view of Miyazaki (U.S. Patent No. 6,335,669).

Claims 5 and 7 are dependent claims that depend either directly or indirectly from independent claim 1. Consequently, these claims are allowable for at least the same reasons as independent claim 1.

Claim 19 was rejected under 35 USC § 103(a) as being unpatentable over Moore et al. (U.S. Patent No. 5,666,272) in view of Edvardsson et al. (U.S. Patent No. 6,342,869).

Claim 19 is a dependent claim that depends directly from independent claim 17. Consequently, claim 19 is allowable for at least the same reasons as independent claim 17. Claim 19 also provides further basis for patentability. For example, claim 19 further defines the antenna interface circuit of claim 17 as including low noise amplifier input matching circuitry. None of the references cited by the Examiner, either alone or in combination, disclose or suggest the claimed antenna interface circuit with low noise amplifier input matching circuitry.

Moore et al. does not explicitly disclose a low noise amplifier (LNA) within either the chip 18 of the lower module 12 or the component(s) 54 of the upper module 14. However, the Examiner takes the position that it would have been obvious to one of ordinary skill in the art at the time the invention was made to include both the LNA and the LNA input matching circuitry of Edvardsson et al. within the external module 14 of Moore et al. “in order to enable maximum signal power transfer.” Again, this appears to be circular reasoning. The LNA input matching circuitry is not needed without the LNA, thus the Examiner modifies Moore et al. to include both an LNA and LNA input matching circuitry so there can be maximum power transfer between the LNA and the antenna. The Applicants submit that a reference that describes the need to include LNA input matching circuitry between an LNA and an antenna to achieve maximum signal power transfer would not motivate a person of ordinary skill in the art to add an LNA and LNA input matching circuitry to Moore et al. Thus, the Examiner has failed to identify any motivation

to combine Moore et al. and Lawrence et al. and has failed to establish a prima facie case of obviousness under 35 U.S.C. § 103(a) with respect to claim 19.

Claims 26 and 35 were rejected under 35 USC § 103(a) as being unpatentable over Moore et al. (U.S. Patent No. 5,666,272) in view of Pennisi et al. (U.S. Patent No. 5,313,365).

Claims 26 and 35 are dependent claims that depend directly from base claims 17 and 33, respectively. Consequently, these claims are allowable for at least the same reasons as the corresponding base claims.

Claim 36 was rejected under 35 USC § 103(a) as being unpatentable over Moore et al. (U.S. Patent No. 5,666,272) Lawrence et al. (U.S. Patent No. 5,936,584).

Claim 36 has been canceled without prejudice or disclaimer of the subject matter therein.

Claims 37 and 38 were rejected under 35 USC § 103(a) as being unpatentable over Moore et al. (U.S. Patent No. 5,666,272) in view of Lawrence et al. (U.S. Patent No. 5,936,584) as applied to claim 36 above, and further in view of Edvardsson et al. (U.S. Patent No. 6,342,869).

Claims 37 and 38 have been canceled without prejudice or disclaimer of the associated subject matter.

Claims 18 and 39 were rejected under 35 USC § 103(a) as being unpatentable over Moore et al. (U.S. Patent No. 5,666,272) in view of Lawrence et al. (U.S. Patent No. 5,936,584).

Claims 18 and 39 have been canceled. As described above, the subject matter of previous claims 18 and 39 has been incorporated into amended claims 17 and 33, respectively.

Claim 40 was rejected under 35 USC § 103(a) as being unpatentable over Moore et al. (U.S. Patent No. 5,666,272) in view of Lawrence et al. (U.S. Patent No. 5,936,584) as applied to claim 39 above, and further in view of Edvardsson et al. (U.S. Patent No. 6,342,869).

Claim 40, as amended, is a dependent claim that depends directly from base claim 33. Consequently, claim 40 is allowable for at least the same reasons as independent claim 33. Claim 40 also provides further basis for patentability. For example, claim 40 further defines the at least one terminal on the upper side of the package as including "at least one terminal to connect said microelectronic device to an external low noise amplifier input matching circuit." None of the references cited by the Examiner, either alone or in combination, disclose or suggest such a microelectronic device.

In paragraph V, on page 16 of the present Office Action, the Examiner states that it would have been obvious to one of ordinary skill in the art at the time the invention was made to include an LNA and LNA input matching circuitry, as taught by Edvardsson et al., within the external module 14 of Moore et al. in order to enable maximum signal power transfer. However, if the LNA of Edvardsson et al. were added to the external module 14 of Moore et al., then there would be no need for the “at least one terminal to connect said microelectronic device to an external low noise amplifier input matching circuit” of claim 40. Instead, the microelectronic device would need at least one terminal to connect to the external LNA and not to the external LNA input matching circuit.

Claim 20 was rejected under 35 USC § 103(a) as being unpatentable over Moore et al. (U.S. Patent No. 5,666,272) in view of Edvardsson et al. (U.S. Patent No. 6,342,869).

Claim 20 is a dependent claim that depends directly from base claim 17. Consequently, claim 20 is allowable for at least the same reasons as independent claim 17. Claim 20 also provides further basis for patentability.

Claim 21 was rejected under 35 USC § 103(a) as being unpatentable over Moore et al. (U.S. Patent No. 5,666,272) in view of Edvardsson et al. (U.S. Patent No. 6,342,869) and Lawrence et al. (U.S. Patent No. 5,936,584).

Claim 21 is a dependent claim that depends directly from base claim 17. Consequently, claim 21 is allowable for at least the same reasons as independent claim 17. Claim 21 also provides further basis for patentability for substantially the same reasons discussed previously with regard to other similar claims.

Claim 22 was rejected under 35 USC § 103(a) as being unpatentable over Moore et al. (U.S. Patent No. 5,666,272) in view of Miyazaki (U.S. Patent No. 6,335,669).

Claim 22 is a dependent claim that depends directly from base claim 17. Consequently, claim 22 is allowable for at least the same reasons as independent claim 17.

Allowable Subject Matter

Claims 11-16, 29-32 and 41-43 have been allowed.

Claims 3, 6, 8, 10, 23, 25 and 28 were objected to as being dependent upon a rejected base claim, but were indicated to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. These claims have been rewritten in the indicated manner and therefore should now be in form for allowance.

Conclusion

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney (480-948-3745) to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 50-2359.

Respectfully submitted,

LUIZ M. FRANCA-NETO ET AL.

By their Representatives,

CUSTOMER NUMBER: 45643
480-948-3745

Date

2/16/05

By

John C. Scott
Reg. No. 38,613

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Mail Stop Amendment, Commissioner of Patents, P.O.Box 1450, Alexandria, VA 22313-1450, on this 16 day of February, 2005.

MEREDITH MESCHER

Name

Meredith Mescher

Signature